Cryomagnets Interconnections

Connection Cryostats

Status

Sector 1-2 : Q19 L2 : Concrete repair – Short circuit

Consolidation of sector 4-5

Plug-in Modules replacement (adapted strategy)

DFB cables swap [F Savary]

Overview - Status

Quick interconnection overview

(Inter)Connection Cryostats Status

Sector	Repair of ICCs
1-2	Pending results of electrical investigation ; see next slide
2-3	Under repair ; end for beginning of W13
3-4	Start delayed (W11 to W12) End foreseen beginning W15 [Eastern, Open Days, in paral with 4-5]
4-5	L5 started ; end for W17 ; not priority
5-6	Afer warm-up (8th) - 3 units ?
6-7	Completed
7-8	Completed
8-1	Completed

- Geometry is under control ; presentation by TS-SU/MME next week at MARIC

(Inter)Connection Cryostats
Sector 1-2

- Yesterday morning (13/3) : TP4-B1performed by ELQA (Preliminary test of the insulation at 50 V on main and spool circuits during the reparation of the connection cryostats)
- Short to ground detected on the MBA.A12 line of the dipole circuit.
- Fault localized between the dipole magnets at position C.19L2 and B.20L2.
- Connection cryostats not concerned by this problem.
- Diagnostics are ongoing to determine the exact location
- Closure of the ICC is proceeding anyway

(Inter)Connection Sector 1-2

- Q19 L2 : [Documented in NC 890391]

Displacement of : Tilt : 1.5 mrad ; Longi. : - 5 mm

Systematic inspection launched by TS/IC

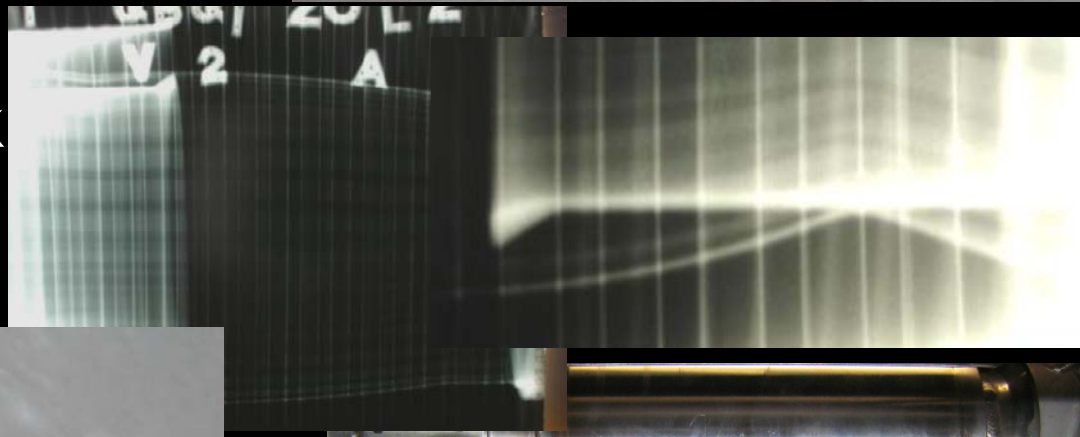
Gamma-rays of PIMs : OK

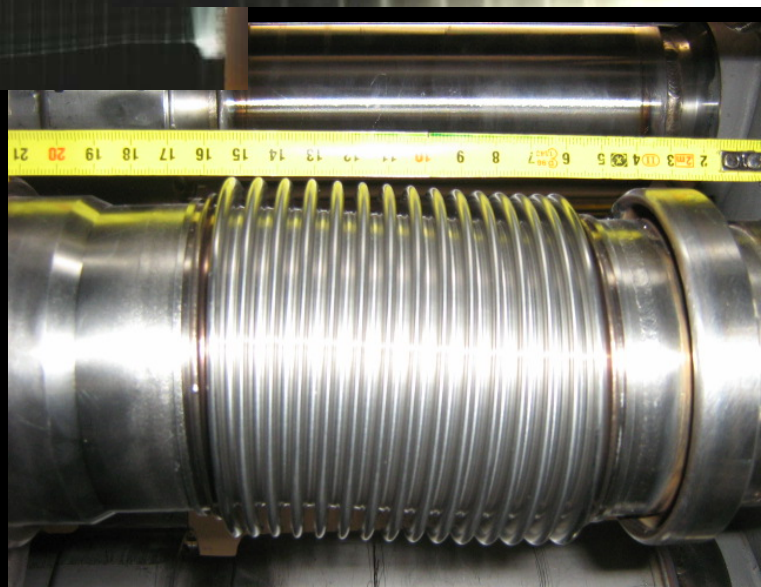
Concrete was repaired [TS/HE]

Test with vacuum on one side : OK

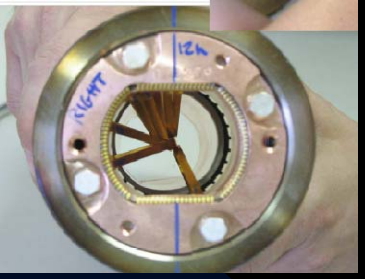
Busbars bellows deformed

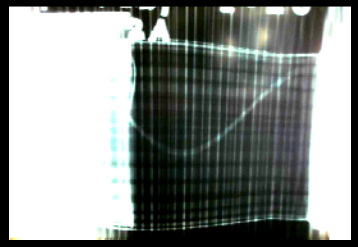
Coincidence ?





Consolidation of sector 4-5





PIMs replacement

Sequence of operations (if reasonable # of collapsed PIMs) : First on 18/3

Ball test to localise failed PIMs (2 per beam line) to an accuracy of one half cell [4 per day]

Opening of the QQBI IC of this sector *[All sectors already vented but 1 with leak(s)]*
Measurements are taken to manufacture replacing PIMs

Cutting of the PIM on both lines – Endoscopic inspection (+/- 100m)

Installation of a replacement or dummy PIM - In parallel radar type measurement

Loop to clear the whole sector

Test of the photometer using cu Time available for 24 PIMs

In parallel, preparation of replacing PIMs Planned on 9-10/4

Rewelding of PIMs – Ball test to validate the sector

Leak test of beam lines – Displace SSS downwards by 2 mm *[Starting W13 but not a priority]*

Reclosure of IC

Pumping and leak test of insulation vacuum – RF reference measurements

Unknowns :

Amplitude of the problem : Preliminary info next Tuesday / confirmed W13
So strategy to be applied ; if >> : systematic opening of IC and Gamma rays

Type of PIMs affected : Preliminary info next Tuesday / confirmed W13

Consolidation of sector 4-5

Repair of 6 kA circuits
in the DFBAs, [DFBLs and DFBMs]

M. Pozzobon, F. Savary, C. Urpin

ICC
14TH MARCH 2008

Scope of the work

- Intervene on the left/right sides of the ATM modules of the DFBAs, DFBLs and DFBMs
  - Q7 to ATM module
  - ATM module to HCM module
- Disconnect up to 5, out the 12, 6 kA connections
- Reconnect them with correct arrangement/grouping (one set of 3 cables shall include +, - and neutral)
- Include all the necessary checks and recommissoning tests

Example: case DFBAs

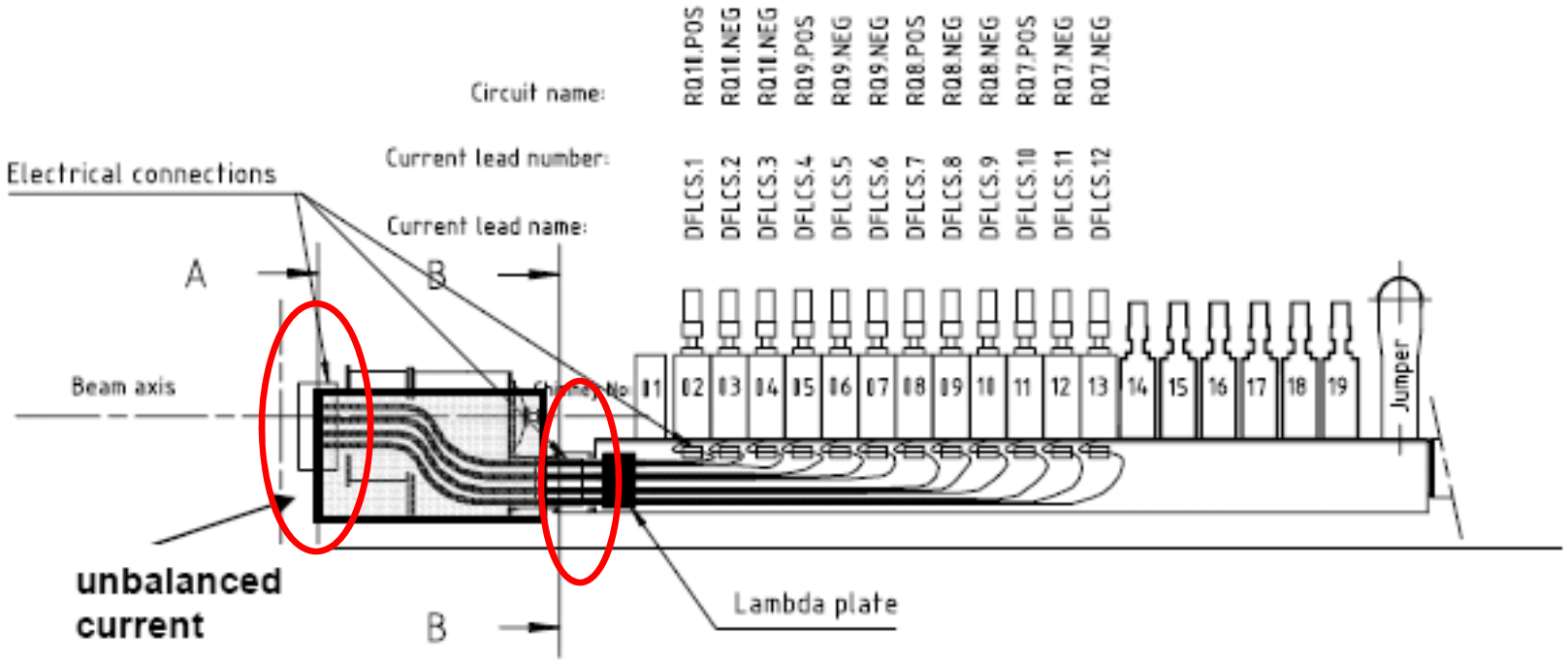


Figure 1. Schematic view of 6kA busbar routing in DFBAs

Courtesy A. Perin

Preparation work on surface

- Launched at the beginning of last week
- To verify the technical feasibility
- To estimate the amount of work and time needed
- To provide hints to help decision
- To anticipate the necessary tooling and replacement pieces

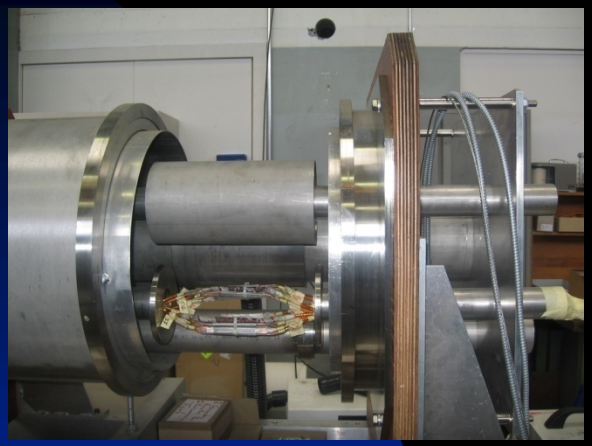
What has been done so far

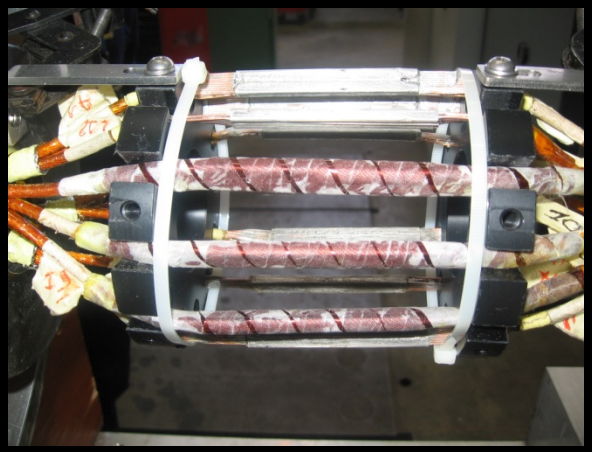
- Work carried out by
  - Claude Urpin, Marc Pozzobon, Frédéric Kolakowski (FSU)
- Technical background recovered from Luc Oberli and Angelo Bonasia deeply involved during the production
- Mock-up recovered from the production in 183

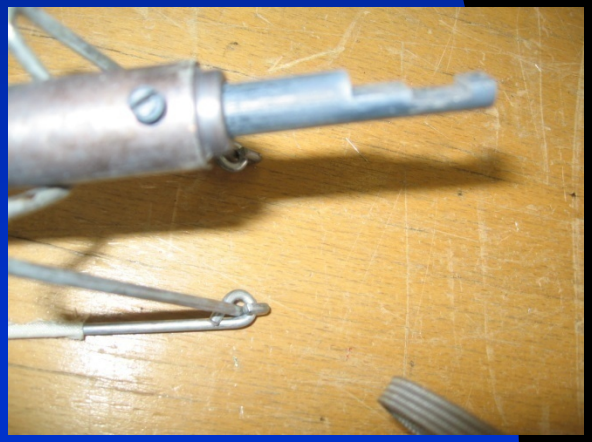
- 12 connections were made
  - 3 of them insulated
  - 4 of each type

- De-brazing trials were carried out, one on the mock-up

Mock-up and method







What's coming next?

- De-braze other 4 connections
- Re-braze the 5 connections and relocate them in the central region of the assembly
- … with a mechanical support made out of insulation material
- Hopefully, ready by next Tuesday 18/3 evening

Preliminary feedback

- Technically feasible?
- Easy?
- Risky?
  -
  -
- Will it possible to do the 2 sides, R4 and L5, in the 6 weeks given?
- Tooling “quasi” available

- Yes
- Certainly not!
- Yes
  - Spacer difficult to remove/put in place
  - We may provoke/reveal shorts to ground
- Not sure at all, one side yes. Probably 4 weeks needed per side

Options :

- “Use as is”
  - ☺ : Commissionned system so no risk to introduce or reveal a defect
  - ☺ : Less work
  - ☹ : Procedure will not be established and validated in-situ
  - ☹ : If intervention necessary later, will be in “radioactive” environment
    [Anyway for the other cases]
- Repair both DFBAs
  - ☺ : Procedure will be established and validated in-situ
  - ☺ : Less interventions later in “radioactive” environment
  - ☹ : More work, never done before in these conditions ; risk on schedule
  - ☹ : Risk to introduce or reveal a defect
- Repair one DFBA and then …
  - ☺ : Procedure will be established and validated in-situ
  - ☺ : Less interventions later in “radioactive” environment
  - ☹ : Limited risk on schedule as only one intervention
  - ☹ : Risk to introduce or reveal a defect
- DECISION TO BE TAKEN SOON (Clock is launched): Next MARIC ? Difficult to balance “necessity” of intervention and risk to create or reveal a defect

Consolidation of sector 4-5

Leaks to repair

Arc / Potentially recurring – Risk level : Low

It was possible to leave with it so …

Interventions :

1. VACSEC 7R4 (NC847504) – CM leak to insulation vacuum of 1 10^{-5} mbar l /sec
   In DS zone, additional mobile turbo pumps are used
   Test are on-going ; will be independent from the rest of the arc
2. VACSEC 15R4 – C' K leak to insulation vacuum of 6 10^{-6} mbar l /sec
   Disappeared during localisation ; leak not present anymore
   Sector vented
3. Check of beam lines leak tightness : on-going
4. Q17L5 and Q29R4 (NC 826696 and 820313) – leak air to insulation vacuum – temporary solution now but to be consolidated by AT-VAC

Risks / Unknowns :

1. Time for localisation – Extra openings to support leak localisation work
2. New leaks created by/during warm-up ☺ None

Consolidation of sector 4-5

1	Plug-in modules	1 st ball test next Tuesday
2	Photometer test	Planned 9-10/4
3	Y lines	IC opened, strategy defined
4	Helium guards	Endoscopic inspection next Monday
5	Leaks	1 disappeared / 1 under localisation
6	Triplet 5L	QRL jumpers under cutting / in advance
7	Q5R4	Opening next Tuesday for investigation
8	Connection Cryostats	Started
9	CC splices	Not critical
10	DFBs cables	To be decided soon for DFBAs

Quick IC overview

Sector	On-going
1-2	Short circuit / ICC repair
2-3	ICC repair
3-4	Repari of ICC delayed to next week
4-5	Consolidation started
5-6	Cold
6-7	Cool-down
7-8	Cool-down
8-1	Cool-down

17 ICs opened:

14 in the arc:

6 for CC, 8 in 4-5

3 in LSS : L5 triplet

DFBX/Q3 + 2 jumpers